Cost analysis of long-term feeding by percutaneous endoscopic gastrostomy in cancer patients in an Italian health district

Abstract The aim of this study was to evaluate prospectively the cost of long-term feeding by percutaneous endoscopic gastrostomy (PEG). Cost analysis was carried out in 34 head and neck cancer patients, followed from the time of PEG placement to the death or the end of the study. Three main items were considered: (a) PEG placement (on an inpatient basis), subdivided into five subitems: the Freka FK-07 gastrostomy kit, materials and anaesthetic drugs used, antibiotics and antisecretory drugs, gastroscope amortization expenses and staff; (b) nutrition, considering the costs of enteral-feeding products, nutrition container and flexible tube connecting the container to the PEG; (c) patient care, dividing the patients into three groups: outpatients, home-care patients and outpatients shifting to home care during the follow-up. All patients had one medical and two nursing visits/month, and, if necessary, immediate additional access to a physician or nurse. The mean daily cost per patient of long-term feeding via PEG was obtained by adding up the mean daily costs per patient of the three items, and was compared with that of feeding via a nasogastric tube, calculated in 11 patients using the same criteria. No procedure-related death nor peri-procedural major or minor complications were observed. The 60-day mortality was 3/34. Seventeen patients were always seen on an outpatient basis and 8 were followed by our home-care unit; 9 outpatients shifted to home care during the follow-up. The mean duration of PEG use was 180.5 days (range 47–639). Two wound infections, treated with antibiotics, occurred during the follow-up. The mean daily costs of placement, nutrition and patient care were (Italian liras) L 2500, 24 510 and 1880 respectively (Deutschemarks: DM 2.08, 20.42 and 1.56), for a total mean daily cost of L 28,890 (DM 24.06), slightly higher than that of feeding via a nasogastric tube (L 27,340; DM 22.78). On the basis of the improved quality of life, as well as from the economic point of view, PEG can be considered the procedure of choice for enteral feeding of cancer patients, provided that a reasonably long survival can be expected.

Key words Cost analysis • Enteral feeding • Percutaneous endoscopic gastrostomy
Introduction

At present, percutaneous endoscopic gastrostomy (PEG) is considered the procedure of choice for providing long-term enteral nutrition to patients unable to swallow. It is tolerated better and from a cosmetic point of view is more acceptable than a nasogastric tube to both patient and family, and achieves a better nutritional result avoiding the disruption of feeding commonly associated with displacement of nasogastric tubes [11, 17]. Moreover, it is faster and cheaper to insert than surgical gastrostomy [1, 5, 13]. For these reasons, PEG plays an important role in the supportive management of cancer patients. In particular, preoperative, postoperative and unresectable head and neck cancer patients are considered appropriate candidates for PEG [2, 3, 16]. Many studies stress the cost-effectiveness of PEG placement [1, 5, 11–13], but, to our knowledge, little is known about the total cost of the long-term management of patients with PEG, that is from the time of PEG placement to the time of PEG removal or the death of patients.

The aim of this prospective study was to evaluate the cost of long-term enteral feeding via PEG in head and neck cancer patients in an Italian Health District.

Patients and methods

Patients

From January 1992 to December 1994, 34 patients (22 male and 12 female, aged 46–84 years), admitted to St. Anna General Hospital of Ferrara (Italy) and affected by unrespectable, relapsed or locally advanced head and neck cancer, entered this prospective study. Eligibility criteria were the following: absence of contraindications to PEG placement [9]; informed consent to PEG placement; consent to being followed-up by our medical and nursing team; no history of recent previous aspiration pneumonia; absence of multiple liver or lung metastases seriously compromising the general conditions of the patients and reducing the expected survival to less than 2 months; normal cardiovascular function, or cardiovascular disability class I or II, according to the New York Heart Association functional classification [15].

Methods

All procedures were carried out in the endoscopy suite by two physicians and a nurse; an anaesthetist was always present. A French gauge 9 Freka-FK 07 gastrostomy tube (Sifra-Fresenius, Isola della Scala, Italy) was inserted by the “pull-through” technique [9]. Intravenous (i.v.) cefotaxime (1 g/12 h) and ranitidine (50 mg/8 h) were given from 12 h before to 60 h after the procedure. Anaesthesia consisted of local xylocaine spray and 5 mg i.v. diazepam; in 6 cases i.v. 50–100 mg propofol was also given.

Enteral feeding began the day after the procedure, at an infusion rate of 100 ml/h, after the patients had been assessed for the presence of bowel sounds. On the whole, 400 ml subdivided into two administrations was delivered on the first day, without use of an infusion pump. Afterwards, infusion was gradually increased with the aim of reaching a sufficient energy supply, but also in accordance to the patient’s tolerance. At the same time training of the patient and family was started.

Once discharged, patients were followed-up until death, PEG removal or the end of the study (15 April 1995). If some patients moved to another health district during the follow-up, their data were evaluated until the time of the change of address. Patients able to attend hospital were seen on an outpatient basis; those unable were visited by our home-care unit. All patients were evaluated monthly by a physician and fortnightly by a skilled nurse; if necessary, immediate access to a physician or nurse of our team was available at any time.

Enteral-feeding products were provided to the patients by our Health District. Different products were used, because of differing nutritional requirements and tolerance: Ensure, Osmolyte, Osmorich (Abbott), Fresubin (Sifra-Fresenius) and Nutrisond (Nutricia). In our experience, combinations of these products have always achieved the optimal volume and nutritional density for each patient and the right amount of fibre, according to the patient’s bowel habit. The patients were allowed to choose the timing of feeds (intermittent or overnight continuous infusion).

Cost analysis

Three main items were considered: (a) PEG placement, (b) enteral nutrition, (c) patient care. Each of them was subdivided into several subitems. Subitem costs were expressed as Italian liras (L); the total cost of each item was converted to Deutschemarks (DM) (rate at March 1995: DM 1 = L1200). All economic calculations were rounded up or down to the next money unit.

PEG placement

The following subitems were considered:

- A Freka FK-07 gastrostomy kit.
- Materials and anaesthetic drugs used.
- Antibiotics and antisecretory drugs.
- Gastroscope amortization expenses, including the cost of two gastrosopies carried out using an Olympus GIF-Q20 fibre-optic gastroscope (price: L 30 000 000), and considering 2000 gastroscope examinations as the mean operative life of a gastroscope.
- Cost of the staff, according to the current wages of physicians and nurses working in the National Health Service (NHS). Attendance for 1 h for the nurse and 30 min for each physician involved (endoscopist, assistant and anaesthetist) was considered a sufficient representative time.

The cost of PEG placement was multiplied by the number of PEG placed or replaced. The total amount was shared among the 34 patients and then divided by the mean duration of PEG use, obtaining the mean daily cost per patient of PEG placement.

The cost of the hospital stay was not considered, as all PEG were placed during hospital stays required for reasons other than PEG placement. If complications due to PEG postponed the discharge, the cost of the additional time in hospital was shared among all patients, divided by the mean duration of PEG use and added to the mean daily cost of PEG placement.

Enteral nutrition

The following subitems were considered:

- Enteral-feeding products: the mean cost of a 500-ml bottle of the five products used was calculated, and multiplied by the mean daily consumption of enteral feeding.